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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-11, 13, 14, 16-21, and 26-33, are rejected under 35 U.S.C. 102(b) as being anticipated by Kuchel (US 4,872,755).

Kuchel show an interferometer for measuring optical phase differences (e.g. Figure 6) comprising

a source module (60) configured to generate mutually orthogonally polarized beams of light from spatially separated sources;

an interferometry module (13-16) receiving said mutually orthogonally polarized beams from said source module, and having at least a reference object (14) and a test object (16) for interaction with said beams; and

a simultaneous phase shifting module (68) receiving a portion of said beams from said interferometry module for generating at least two phase-shifted (67b) interferograms substantially simultaneously from said beams.

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With respect to claim 2, Kuchel shows a Fizeau arrangement configured to define a substantially common path for said beams between said source module and a reflective surface of said reference object.

With respect to claims 3 and 4, see polarizing beamsplitter (60a) that produces the orthogonal test and reference beams that are spatially separated.

With respect to claim 5, the reference and test beams received by said simultaneous phase shifting module substantially overlap each other.

With respect to claim 6, the laser (11) produces the mutually orthogonally polarized beams that are coherent.

With respect to claim 7, the beamsplitter (60a) splits the beam from laser (11) to produce two spatially separated sources.

With respect to claims 8 and 18, beamsplitter 12d is an alignment module positioned to intercept the beams between the interferometry module and the simultaneous phase-shifting module.

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With respect to claim 9, 17b, 67a, and 18a-d are imaging modules.

With respect to claims 10, 20, and 21, the source module includes a linearly polarized light source (11) and a polarization beamsplitter (60a) configured to split linearly polarized light into said two mutually orthogonally polarized beams, wherein said polarization beamsplitter comprises a prism.

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With respect to claim 11, the sources are virtual.

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With respect to claims 13 and 14, the interferometry module further includes a nonpolarizing beamsplitter (12d) wherein the nonpolarizing beamsplitter is positioned substantially between the source module (60) and the reference object (14).

16. An interferometric system of claim 15, wherein the quarter waveplate is positioned substantially between the nonpolarizing beamsplitter and a collimator.

With respect to claim 17, the interferometry module is of a Fizeau configuration.

With respect to claim 19, Kuchel shows an imaging module (17b, 67a) is positioned to intercept the beams between the interferometry module and the simultaneous phase shifting module.

With respect to claims 27 and 28, Kuchel shows an aperture filter (17a) to block said other portion of the beams from entering the simultaneous phase shifting module.

With respect to claim 29, Kuchel shows:

a source module (60) having a source (11) of polarized light and a polarization beamsplitter (60a) configured to act on said polarized light to generate mutually orthogonally polarized beams of light;

an interferometry module (13-16) receiving said orthogonally polarized beams from said source, having optical elements (12d, 13), a reference object (14) and a test object (16), where said optical elements are configured to define a substantially common pathway for said beams (Fizeau), said interferometry module further comprising means for overlapping (13) a test beam and a reference beam;

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a phase shifting module (68) receiving a portion of said beams from said interferometry module to generate at least two phase-shifted (67b) interferograms substantially simultaneously from said test and reference beams.

With respect to claim 30, the polarized light from said source module is linearly polarized.

With respect to claim 31, elements (18a-d) are means for viewing said test and reference beams.

With respect to claim 32, polarizing beamsplitter (68b or 68c) is a means for selecting said test and reference beams.

With respect to claim 33, Kuchel shows:

a source module (60) having a source (11) of linearly polarized light, and a polarization beamsplitter (60a) configured to generate mutually orthogonally polarized wavefronts as emanating from two spatially separated sources;

an interferometry module (12b-16) receiving said orthogonally polarized wavefronts, said interferometry module having a test object (16) and a reference (14), a beam splitter (12d) and a collimator (13), said beamsplitter and said collimator defining a substantially common path (Fizeau) for said orthogonally polarized wavefronts, wherein orthogonally polarized reference wavefronts and orthogonally polarized test wavefronts exit the interferometry module; means for overlapping (17) one of said orthogonally polarized reference wavefront with one of said orthogonally polarized test wavefronts;

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a simultaneous phase shifting module (68) receiving said overlapping one reference wavefront and said one test wavefront from said interferometry module for generating at least two phase-shifted (67b) interferograms substantially simultaneously.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12, 15, 22-25, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuchel as applied to their respective independent claim or as applied to claims 1 and 33 above.

With respect to claim 12, Kuchel does not show the sources being real, however it is well known in the art that there are several ways to make orthogonally polarized beams, including the use of two separate real sources. At the time of the invention, one of ordinary skill in the art would have used two real sources in order to produce beams of high intensity. By using two real sources, the beams have more intensity than the use of a single source where the beam is split in intensity to produce the two beams.

With respect to claims 15 and 34, Kuchel shows the quarter wave plate located in the source, and not positioned between the source module and the reference object, however the relocation of a working part only requires routine skill in the art.

With respect to claims 22-25, Official Notice is taken that the different forms of polarizing beamsplitters are well known in the art and are functional equivalents. At the time of the invention, a skilled artisan would have used calcite for its quality optical properties, would have used a cube splitter for low cost, and would have used optical fibers for flexibility.

### ***Response to Arguments***

5. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "two light sources that are separated spatially but are not separated temporally," "common path," "overlap over the entire optical path") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

6. The recitation of "a source module configured to generate mutually orthogonally polarized beams of light from spatially separated source" do not require that the sources be light sources, nor require that the beams not be temporally separated.

7. With regards to applicant's argument of claim 34, the functional purpose of an element in a claim drawn to structure does not patentably distinguish from the prior art.



***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hwa S. Lee (Andrew) whose telephone number is 571-272-2419. The examiner can normally be reached on Monday, Tuesday, Thursday, and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur R. Chowdhury can be reached on 571-272-2800. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hwa S. Lee (Andrew)/  
Primary Examiner, Art Unit 2886